PATENT ABSTRACTS OF JAPAN

(11)Publication number : **2001-356040**

(43)Date of publication of application : **26.12.2001**

(51)Int.Cl. **G01F 23/38**
B60K 15/077
F02B 77/08
F02M 37/00
F02M 37/10

(21)Application number : **2000-180049**

(22)Date of filing : **15.06.2000**

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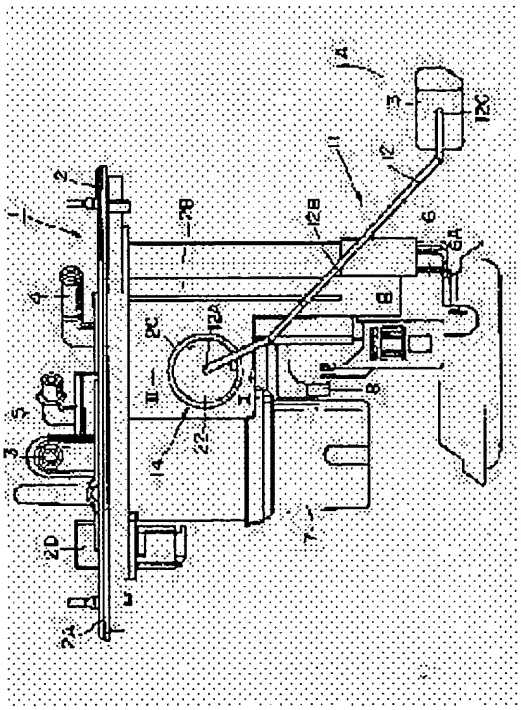
(54) **FUEL GAUGE**

(57)Abstract:

PROBLEM TO BE SOLVED: To enhance reliability and durability by eliminating moving contacts from a fuel gauge.

SOLUTION: A fuel pump 6 and the like are set to a pump setting bracket 2 of a fuel feed system 1 and also a casing-storing part 2C is formed. The fuel gauge 11 is constituted of an arm 12, a float 13 and a level detector 14. A casing of the level detector 14 is set to the casing-storing part 2C. The casing is provided with a magnet rotating together with the arm 12, a first and a second yokes opposite to the magnet. A Hall element is arranged between the first and the second yokes. A cover 2 is fitted to the casing in this state to prevent the magnet from falling off. The Hall element outputs detection signals corresponding to an opposite area between the magnet and the first, second yokes.



LEGAL STATUS

[Date of request for examination] 28.05.2003

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

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CLAIMS

[Claim(s)]
[Claim 1] The arm with which the end face side was supported free [rotation] by the bracket prepared in the fuel tank, In the fuel gauge which consists of a float which it is prepared at the tip of this arm and displaced according to the oil level of the fuel in said fuel tank, and an oil-level detection means to be formed in the end face of said arm and to output the signal according to the variation rate of this float Casing by which said oil-level detection means was formed in the end face of said arm, The magnet which is prepared in this casing and rotates together with said arm, The 1st and 2nd York which was established in said casing and countered mutually on both sides of this magnet, this -- the fuel gauge characterized by constituting with a signal output means to be established between the 1st and 2nd York and to output the signal corresponding to the opposed face product of said magnet and 1st and 2nd York.

[Claim 2] It is the fuel gauge according to claim 1 which said bracket is a pump mounting bracket which attaches a fuel pump, and comes to prepare said casing in this pump mounting bracket.
[Claim 3] Said casing is a fuel gauge according to claim 2 which it comes to constitute by the tubed height formed in said pump mounting bracket.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention is used for detecting the remaining fuel in the fuel tank of an automobile, and relates to a suitable fuel gauge.
[0002]
[Description of the Prior Art] Generally, what was constituted by the float which floats on the oil level in a fuel tank as a fuel gauge is shown in JP,3-28345,Y etc., and the variable resistance from which it connects with this float and resistance changes according to the height of an oil level is known. And the fuel gauge by the conventional technique connects the sliding child of variable resistance to a float through an arm etc., follows the float which floats the oil-level top of the fuel in a fuel tank, and moves a sliding child. Thereby, since the resistance of variable resistance changes, the oil-level height of the fuel in a fuel tank, i.e., remaining fuel, has been detected by connecting the constant voltage power supply which impresses a fixed electrical potential difference to variable resistance, and detecting the current which flows to variable resistance.
[0003]
[Problem(s) to be Solved by the Invention] By the way, at the fuel gauge by the conventional technique mentioned above, the variable resistance from which resistance changes according to a sliding child's contact location is used in the condition of having been immersed in fuels, such as a gasoline. For this reason, there is a possibility that an insulating coat may be formed in the sliding contacts which they are between a sliding child and a resistor with the sulfur component in a gasoline and an additive, and detection of remaining fuel may become impossible by such insulating coat.
[0004] Moreover, since the variable resistance which has sliding contacts is used, there is an inclination which wear produces to a resistor and a sliding child in proportion to the count of actuation. For this reason, when it is used for a long period of time, having continued, there is also a problem that the detection precision of remaining fuel falls gradually.
[0005] Moreover, since the fuel gauge is installed in the fuel tank, when the above defects occur, it needs to demount and fix a fuel tank from a car. For this reason, while the time and effort for fixing the defect of a fuel gauge and costs increase, there are also the fuel gauge itself and a problem of becoming expensive in order to take the sulfur in a gasoline and the measures against an additive.
[0006] Furthermore, in the case where a fuel gauge is attached in a fuel pump, since a fuel gauge is fixed to the bracket of a fuel pump etc. using technique, such as a snap fitting, there is an inclination which components mark increase. For this reason, while a manufacturing cost rises, there is also a problem that dependability tends to fall by the increment in a junction part.
[0007] Moreover, in the fuel gauge by the conventional technique, since the amount of changes in resistance is uniquely prescribed by the overall length of the sliding section of a resistor, and the amount of strokes per unit include angle, there is also a problem that it is necessary to fit the arm configuration of a float for every tank configuration.
[0008] This invention was made in view of the problem of the conventional technique mentioned above,

and this invention aims at offering the fuel gauge which raised dependability and endurance by abolishing sliding contacts from a fuel gauge.
[0009]
[Means for Solving the Problem] It is applied to the fuel gauge which consists of an oil-level detection means this invention is prepared in the arm by which the end face side was supported free [rotation to the bracket prepared in the fuel tank], the float which it is prepared at the tip of this arm and displaced according to the oil level of the fuel in said fuel tank, and the end face of said arm in order to solve the technical problem mentioned above, and output the signal according to the variation rate of this float.
[0010] And the description of a configuration of that invention of claim 1 adopts Casing in which the oil-level detection means was formed by the end face of an arm, and the magnet which is prepared in this casing and rotates together with said arm, the 1st and 2nd York which was established in said casing and countered mutually on both sides of this magnet -- this -- it is prepared between the 1st and 2nd York, and is in having constituted with a signal output means to output the signal corresponding to the opposed face product of said magnet and 1st and 2nd York.
[0011] Thus, by constituting, a float displaces according to the oil level of the fuel in a fuel tank, and the end face side of an arm rotates. At this time, a magnet rotates together with an arm and the opposed face product of a magnet and the 1st and 2nd York changes according to the rotation angle of an arm. And since a signal output means outputs the signal corresponding to the opposed face product of a magnet and the 1st and 2nd York, it can detect the rotation angle of an arm, i.e., the oil-level height of a fuel, by using the signal outputted from a signal output means.
[0012] Moreover, in invention of claim 2, a bracket is a pump mounting bracket which attaches a fuel pump, and casing is prepared in this pump mounting bracket.
[0013] Thereby, a fuel gauge can be attached in a fuel pump and a fuel gauge can be arranged in a fuel tank with a fuel pump.
[0014] Furthermore, having constituted by the tubed height which formed casing in the pump mounting bracket has invention of claim 3.
[0015] Thereby, casing can be unified and formed in a pump mounting bracket, and a fuel gauge can be constituted by attaching a magnet etc. in this casing.
[0016]
[Embodiment of the Invention] The case where the fuel gauge concerning the gestalt of operation of this invention is hereafter attached in a fuel supply system is mentioned as an example, and it explains to a detail, referring to drawing 1 thru/or drawing 10 .
[0017] First, drawing 1 thru/or drawing 7 show the gestalt of operation of the 1st of this invention, 1 is the fuel supply system arranged in a fuel tank, and this fuel supply system 1 is constituted by the pump mounting bracket 2 and fuel pump 6 which are mentioned later, and the fuel-filter 7 grade.
[0018] 2 is the pump mounting bracket attached in the upper part side of a fuel tank, and this pump mounting bracket 2 is formed with a resin ingredient, and is constituted from covering device 2A fixed to a fuel tank, and this covering device 2A by attachment cylinder part 2B which hung in the fuel tank. And the suction pipe 4 for attracting the fuel in the delivery pipe 3 which supplies a fuel outside a fuel tank, and a subtank, and the return pipe 5 which returns a surplus fuel to a fuel tank are formed in covering device 2A.
[0019] Moreover, casing hold section 2C which holds the casing 15 of a fuel gauge 11 mentioned later projects to attachment cylinder part 2B in the shape of a cylinder, and is prepared in it. Furthermore, connector 2D for performing supply of the power for a drive, the output of a signal, etc. to the fuel gauge 11 mentioned later is prepared in covering device 2A.
[0020] 6 is the fuel pump of the shape of an approximate circle column prepared in attachment cylinder part 2B of the pump mounting bracket 2, and this fuel pump 6 has intake port 6A in which the inlet filter etc. was attached. And a fuel pump 6 inhales the fuel in a fuel tank from intake port 6A, and it carries out the regurgitation towards the fuel filter 7 which mentions this fuel later.
[0021] 7 is the fuel filter prepared in the pump mounting bracket 2, and this fuel filter 7 filters the fuel breathed out from the fuel pump 6 by the filter element (not shown), and carries out the regurgitation of

the defecated fuel from a delivery pipe 3.
[0022] 8 is the suction pump for subtanks prepared in the pump mounting bracket 2, and this suction pump 8 is constituted by the so-called jet pump, and is connected to the suction pipe 4 and the return pipe 5. And using the flow of the fuel which returns in a fuel tank through the return pipe 5, the fuel in a subtank is turned in a fuel tank, and a suction pump 8 attracts it.
[0023] Next, the fuel gauge 11 attached in the fuel supply system 1 is explained.
[0024] 11 is the fuel gauge prepared in the pump mounting bracket 2 of a fuel supply system 1, and the profile configuration of this fuel gauge 11 is carried out by the arm 12 mentioned later, float 13, and oil-level detection equipment 14.
[0025] 12 is the arm supported by the pump mounting bracket 2 of a fuel supply system 1 rotatable through the below-mentioned oil-level detection equipment 14. This arm 12 Supporter 12A which is prepared in a end face side and prolonged towards the pump mounting bracket 2, It is constituted by attachment section 12C in which it is located at the tip of rocking arm 12B which was crooked and prolonged from this supporter 12A, and became rockable as a core about supporter 12A, and this rocking arm 12B, and float 13 is attached.
[0026] 13 is the float attached at the tip of an arm 12, and this float 13 follows the oil level of the fuel in a fuel tank, and floats an oil-level top. Thereby, float 13 makes an arm 12 rock focusing on supporter 12A.
[0027] 14 is oil-level detection equipment which was located in the end face side of an arm 12, and was attached in casing hold section 2C of the pump mounting bracket 2, and this oil-level detection equipment 14 is constituted by the below-mentioned casing 15, 1st and 2nd York 18 and 19, and hall device 21 grade.
[0028] 15 is casing held in casing hold section 2C of the pump mounting bracket 2, and this casing 15 is formed in the shape of [roofed] a cylinder of non-magnetic materials, such as a resin ingredient, and holds to one 1st and 2nd York 18 and 19 mentioned later with means, such as resin mold. And with 1st and 2nd York 18 and 19, in casing hold section 2C, it pastes up and casing 15 is positioning 1st and 2nd York 18 and 19 to the below-mentioned magnet 17.
[0029] 16 is the rotation plate attached in supporter 12A of an arm 12, this rotation plate 16 was formed in approximate circle tabular, and the below-mentioned magnet 17 has fixed it on this rotation plate 16. ******** 12A1 projected to supporter 12A of an arm 12 here on the direction outside of a path It is prepared. And the rotation plate 16 is this ******** 12A1. By performing resin mold in the condition of having laid underground, where supporter 12A is ******(ed), it is fixed.
[0030] Moreover, the rotation plate 16 is formed in disc-like one with a stage of sliding shank 16A used as the inside diameter of casing 15, and an almost equal outer-diameter dimension, and flange 16B formed in the major diameter rather than this sliding shank 16A. And after the rotation plate 16 has blockaded the opening side of casing 15, while sliding shank 16A is inserted into casing 15, flange 16B contacts the opening edge of casing 15. Thereby, sliding shank 16A ****s and rotates the rotation plate 16 to casing 15.
[0031] 17 is the magnet which fixed with adhesives etc. on the rotation plate 16, and this magnet 17 is formed the shape of the shape of a rectangle, and a gold coin from which the both sides of the die-length direction became a magnetic pole. And the die-length direction both-ends side serves as the convex circular face parts 17A and 17B, and, as for this magnet 17, serves as the parallel surface parts 17C and 17D between convex circular face part 17A and 17B. Moreover, the convex circular face parts 17A and 17B of a magnet 17 are the include angles alpha 1 of about 90 degrees as opposed to rotation core O-O. It is had and formed.
[0032] 18 is the 1st York attached in casing 15, and leads this 1st York 18 to the hall device 21 which mentions magnetic flux with a magnet 17 later. and 1st curve tabular pole piece section 18A which York 18 counters with the convex circular face parts 17A and 17B of a magnet 17 -- this -- it is bent and formed in the sense within the direction of a path from 1st pole piece section 18A, and consists of the 1st overhanging section 18B prolonged in plate-like so that a magnet 17 might be straddled. Moreover, 1st pole piece section 18A is the include angle alpha 2 of about 90 degrees as opposed to rotation core O-O.

Having, it extended and overhanging section 18B of York 18 has covered the magnet 17 partially.
[0033] 19 is the 2nd York attached in casing 15, and by countering in 1st York 18 and the direction of a path on both sides of a magnet 17, this 2nd York 19 forms a magnetic circuit, and leads it to the hall device 21 which mentions magnetic flux with a magnet 17 later. and 2nd pole piece section 19A which York 19 counters like York 18 with the convex circular face parts 17B and 17A of a magnet 17 -- this -- it is bent and formed in the sense within the direction of a path from 2nd pole piece section 19A, and consists of the 2nd overhanging section 19B prolonged in plate-like so that a magnet 17 might be straddled.
[0034] Moreover, 2nd pole piece section 19A is the almost same include angle alpha 2 as 1st pole piece section 18A to rotation core O-O while countering in 1st pole piece section 18A and the direction of a path on both sides of a magnet 17. It has had and extended.
[0035] On the other hand, 2nd overhanging section 19B is prolonged to the location where the part exceeds rotation core O-O of a magnet 17, and 1st overhanging section 18B is partially overlapped with the clearance between fixed spacing. And the below-mentioned hall device 21 is formed between the 1st and 2nd overhanging section 18B and 19B. Thereby, the 1st and 2nd overhanging section 18B and 19B has composition which sandwiches the shaft-orientations both sides of a hall device 21.
[0036] Moreover, when countering [a hemihedry] mostly with the convex circular face parts 17A and 17B of a magnet 17, the 1st and 2nd pole piece section 18A and 19A has suspended the float 13 in the lowest location (pars-basilaris-ossis-occipitalis side), as shown in drawing 1 . And as shown in drawing 2 , when float 13 moves in the direction of **** A according to the rise of an oil level, as shown in drawing 7 , a magnet 17 rotates in the direction of **** B, and the opposed face product of the 1st and 2nd pole piece section 18A and 19A and the convex circular face parts 17A and 17B decreases gradually. And when float 13 moves to the mid-position, the convex circular face parts 17A and 17B of a magnet 17 move to the mid-position with the 1st and 2nd pole piece section 18A and 19A, and the opposed face product of the 1st and 2nd pole piece section 18A and 19A and the convex circular face parts 17A and 17B becomes the smallest. Furthermore, when float 13 goes up and it moves to the highest location, the 1st and 2nd pole piece section 18A and 19A counters [a hemihedry] mostly with the convex circular face parts 17B and 17A of a magnet 17.
[0037] 20 is the flexible substrate formed with the resin ingredient etc., as shown in this flexible substrate 20 at drawing 3 , a hall device 21 is attached, and it is arranged in the clearance between overhang 18B of York 18 and 19, and 19B.
[0038] 21 is a hall device as a signal output means, and this hall device 21 is attached in the flexible substrate 20, and is arranged in the clearance between 1st and 2nd overhanging section 18B and 19B. Moreover, the magnetic detection direction of a hall device 21 is parallel to the shaft orientations of supporter 12A of the arm 12 used as a rotation shaft, and is the direction which intersects perpendicularly with the magnetic pole line of a magnet 17. And a hall device 21 outputs the detecting signal proportional to the flux density passing through the inside of the magnetic circuit which consists of a magnet 17, 1st York 18, and 2nd York 19.
[0039] moreover, a hall device 21 is connected to the passive circuit elements (not shown) prepared in the flexible substrate 20 -- these passive circuit elements are both connected to connector 2D of the pump mounting bracket 2 through wiring etc. And passive circuit elements calculate and amplify the detecting signal outputted from a hall device 21, and output it outside through connector 2D.
[0040] 22 is covering which lidded the opening side of casing 15 and was attached, this covering 22 is formed in the shape of [of an owner bottom] a cylinder, and insertion hole 22A for inserting in supporter 12A of an arm 12 is prepared in the center position. And covering 22 can attach the periphery side of casing 15 in the opening side of casing 15 removable in the state of a wrap, and makes the so-called snap fitting structure.
[0041] Moreover, height 22B projected in the shape of a circular ring is prepared in the bottom circles periphery side of covering 22. And between casing 15, covering 22 was attached, where the rotation plate 16 is inserted, and when height 22B contacts the tooth back of the rotation plate 16, the rotation plate 16 is positioned to shaft orientations.

[0042] Furthermore, to covering 22, the stopper sections 22C and 22D which regulate the rotation range of an arm 12 at about about 90 degrees project, and are prepared, and these stopper sections 22C and 22D contact rocking arm 12B of an arm 12, when float 13 moves to the lowest location or the highest location, and they regulate migration beyond it.
[0043] The fuel gauge by the gestalt of this operation is explained constituting the fuel gauge of 2 pole methods and referring to drawing 7 about the actuation then by two York 18 and 19, like ****.
[0044] First, when the lowest location has float 13, convex circular face part 17A of a magnet 17 counters with pole piece section 18A of 1st York 18, and convex circular face part 17B counters with pole piece section 19A of 2nd York 19. Thereby, the magnetic flux of a magnet 17 is led to a hall device 21 through the 1st York 18 and 2nd York 19. At this time, a hall device 21 outputs the forward detecting signal corresponding to the flux density passing through York 18 and 19.
[0045] On the other hand, when float 13 goes up and it moves to the mid-position of the height direction, the convex circular face parts 17A and 17B of a magnet 17 are located in the center of 1st pole piece section 18A and 2nd pole piece section 19A. Since the convex circular face parts 17A and 17B of a magnet 17 have countered neither of the pole piece sections, 18A nor 19A, at this time, the magnetic flux from a magnet 17 hardly passes through York 18 and 19, but each hall device 21 outputs about 0 detecting signal.
[0046] Moreover, when float 13 goes up further and moves to the highest location, convex circular face part 17A of a magnet 17 counters with pole piece section 19A of 2nd York 19, and convex circular face part 17B counters with pole piece section 18A of 1st York 18. Thereby, the magnetic flux of a magnet 17 is led to a hall device 21 through 1st and 2nd York 18 and 19. At this time, a hall device 21 outputs the negative detecting signal corresponding to the flux density passing through York 18 and 19.
[0047] Thus, since a hall device 21 outputs the detecting signal proportional to the height location of float 13, i.e., the oil-level height location of a fuel, it can detect the remaining fuel in a fuel tank using this detecting signal.
[0048] The magnet 17 which formed oil-level detection equipment 14 rotatable in casing 15 in this way according to the fuel gauge 11 by the gestalt of this operation, 1st and 2nd York 18 and 19 which countered mutually on both sides of this magnet 17, Since the hall device 21 which outputs the signal corresponding to the opposed face product of a magnet 17 and 1st and 2nd York 18 and 19 constituted, sliding contacts like the fuel gauge by the conventional technique can be abolished, and the fuel gauge 11 of a non-contact mold can be constituted.
[0049] For this reason, it does not become impossible like the conventional technique detecting remaining fuel by the poor contact in sliding contacts, and the fall of the detection precision by wear of sliding contacts etc. does not arise. Therefore, it can continue at a long period of time, remaining fuel can be detected certainly, and the dependability of a fuel gauge 11 and endurance can be improved.
[0050] Moreover, since the maintenance by the defect of a fuel gauge 11 can be made unnecessary, a maintenance cost can be reduced. Furthermore, it is not necessary to take the sulfur in a gasoline, and the measures against an additive against a fuel gauge 11. Moreover, while York 18 and 19 forms in casing 15 in one, it can be made subashy where a magnet 17 and covering 22 are attached in casing 15. For this reason, since a production process can be simplified while component part mark are reducible, a manufacturing cost can be reduced.
[0051] Furthermore, the detecting signal outputted from a hall device 21 can adjust the value over the rotation angle of a magnet 17 easily by using an operational amplifier etc. For this reason, the fuel gauge 11 by the gestalt of this operation can be easily applied to the fuel tank of varieties, without fitting the configuration of an arm 12 for every configuration of a fuel tank.
[0052] Moreover, it is not necessary to prepare sliding contacts in rocking arm 12B of an arm 12 like the conventional technique, and since it can concentrate on the outskirts of supporter 12A of an arm 12 and the oil-level detection equipment 14 of a fuel gauge 11 can be arranged, oil-level detection equipment 14 can be miniaturized compared with the conventional technique.
[0053] Furthermore, since two York 18 and 19 constituted the fuel gauge 11 of 2 pole methods, while being able to miniaturize the fuel gauge 11 whole compared with the case where three or more York is

used, structure can be simplified and a manufacturing cost can be reduced.
[0054] Moreover, since casing 15 was formed in the pump mounting bracket 2 which attaches a fuel pump 6 in a fuel tank, a fuel gauge 11 can be arranged in a fuel tank with a fuel pump 6.
[0055] Next, drawing 8 shows the gestalt of operation of the 2nd of this invention, and the description of the gestalt of this operation is to have formed oil-level detection equipment in the pump mounting bracket of a fuel supply system in one. In addition, with the gestalt of this operation, the same sign of the same component as the gestalt of said 1st operation shall be attached, and the explanation shall be omitted.
[0056] 31 is oil-level detection equipment by the gestalt of this operation, and this oil-level detection equipment 31 is constituted by the below-mentioned tubed height 32, 1st and 2nd York 18 and 19, and hall device 21 grade like the oil-level detection equipment 14 by the gestalt of the 1st operation.
[0057] 32 is a tubed height as casing formed in attachment cylinder part 2B of the pump mounting bracket 2 in one, and this tubed height 32 is formed in the shape of [roofed] a cylinder, and it holds 1st and 2nd York 18 and 19 to one with means, such as resin mold. And the tubed height 32 is equipped with the rotation plate 16 with which the arm 12 and the magnet 17 were attached rotatable, and this rotation plate 16 is held with covering 22 at a ****** condition.
[0058] In this way, the almost same operation effectiveness as the gestalt of the 1st operation can be acquired also with the gestalt of this operation. However, with the gestalt of this operation, since the tubed height 32 of oil-level detection equipment 31 was formed in the pump mounting bracket 2 in one, as compared with the gestalt of the 1st operation, components mark are reducible. For this reason, while a manufacturing cost is reducible, the defects at the time of manufacture can be reduced and dependability can be improved. Moreover, since the tubed height 32 was united with the pump mounting bracket 2, to a fuel supply system 1, two functions of fuel supply and oil-level detection can be unified.
[0059] Next, drawing 9 and drawing 10 show the gestalt of operation of the 3rd of this invention, the description of the gestalt of this operation is made to deform the tubed height which really [of a pump mounting bracket] formed the rotation plate of oil-level detection equipment with heat caulking, and it is in having fixed. In addition, with the gestalt of this operation, the same sign of the same component as the gestalt of said 1st operation shall be attached, and the explanation shall be omitted.
[0060] 41 is oil-level detection equipment by the gestalt of this operation, and this oil-level detection equipment 41 is constituted by the below-mentioned tubed height 42, 1st and 2nd York 18 and 19, and hall device 21 grade like the oil-level detection equipment 14 by the gestalt of the 1st operation.
[0061] 42 is a tubed height as casing formed in attachment cylinder part 2B of the pump mounting bracket 2 in one, and this tubed height 42 is formed in the shape of [roofed] a cylinder, and it holds 1st and 2nd York 18 and 19 to one with means, such as resin mold. Moreover, Itabe 42A of the shape of four radii is prolonged in shaft orientations, and is formed at the tip of the opening side at the tubed height 42. And after Itabe 42A of the tubed height 42 equips the tubed height 42 with the rotation plate 16, it is made to deform into the condition of having bent so that the rotation plate 16 might be covered using the means of heat caulking etc., as shown in drawing 9 . Thereby, the rotation plate 16 is held by Itabe 42A at a ****** condition.
[0062] In this way, the almost same operation effectiveness as the gestalt of the 1st operation can be acquired also with the gestalt of this operation. However, with the gestalt of this operation, since covering which performs ****** of the rotation plate 16 was abolished, components mark can be reduced as compared with the gestalt of the 1st operation, and a manufacturing cost can be reduced further.
[0063] In addition, although a fuel gauge 11 shall be attached in the pump mounting bracket 2 of a fuel supply system 1 with the gestalt of said the operation of each, this invention is good also as a configuration which attaches for example, not only this but a fuel gauge simple substance in the bracket prepared in the fuel tank directly.
[0064] Moreover, although a magnet 17 shall be used and fixed to the rotation plate 16 for means, such as adhesion, with the gestalt of said the operation of each, the resin mold of the rotation plate may be carried out for a magnet 17 by attachment ****** at supporter 12A of an arm 12, and insert molding of

the magnet may be carried out to a rotation plate, for example.
[0065] Moreover, although the oil-level detection equipments 14, 31, and 41 of 2 pole methods shall be constituted from a gestalt of said the operation of each using two York 18 and 19, the oil-level detection equipment of 3 pole methods may be constituted using three York as indicated by JP,11-264711,A, for example, and the oil-level detection equipment of four or more poles may be used.
[0066]
[Effect of the Invention] The magnet which established the oil-level detection means rotatable in casing according to invention of claim 1 as explained in full detail above, Since a signal output means to output the signal corresponding to the opposed face product of the 1st and 2nd York which countered mutually on both sides of this magnet, and a magnet and the 1st and 2nd York constituted Sliding contacts like the fuel gauge by the conventional technique can be abolished, it can continue at a long period of time, remaining fuel can be detected certainly, and the dependability of a fuel gauge and endurance can be improved.
[0067] Moreover, since it is not necessary to take the sulfur in a fuel, and the measures against an additive against a fuel gauge and oil-level detection equipment can be made subashy, while component part mark are reducible, a production process can be simplified and a manufacturing cost can be reduced. Moreover, since it can concentrate on the end face side of an arm and an oil-level detection means can be arranged, an oil-level detection means can be miniaturized compared with the conventional technique.
[0068] Furthermore, the signal outputted from a signal output means can be easily applied to the fuel tank of varieties, without fitting the configuration of an arm for every configuration of a fuel tank, since the value over the rotation angle of a magnet can be easily adjusted by using an operational amplifier etc.
[0069] Moreover, since casing was prepared in the pump mounting bracket which attaches a fuel pump in a fuel tank, while being able to arrange a fuel gauge in a fuel tank with a fuel pump according to invention of claim 2, to a fuel pump, two functions of fuel supply and oil-level detection can be unified.
[0070] Moreover, since the tubed height which formed casing of an oil-level detection means in the pump mounting bracket 2 in one constituted, while according to invention of claim 3 being able to reduce the components mark of an oil-level detection means and being able to reduce a manufacturing cost, the defects at the time of manufacture can be reduced and dependability can be improved.

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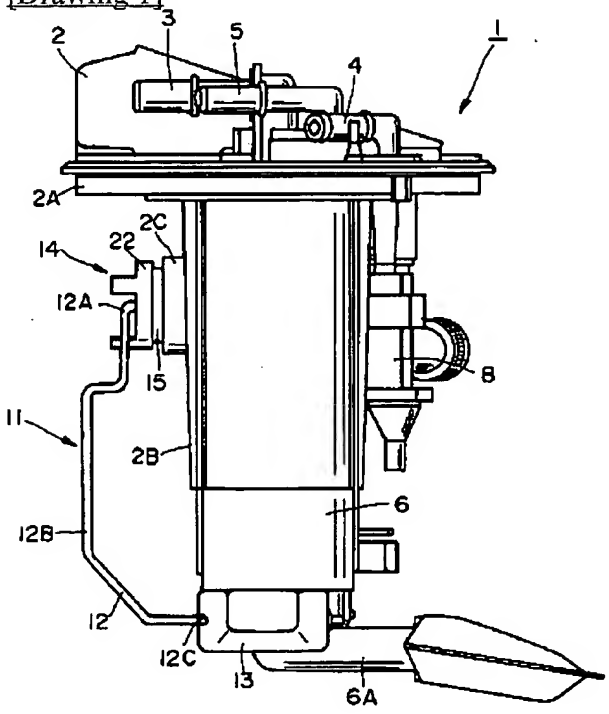
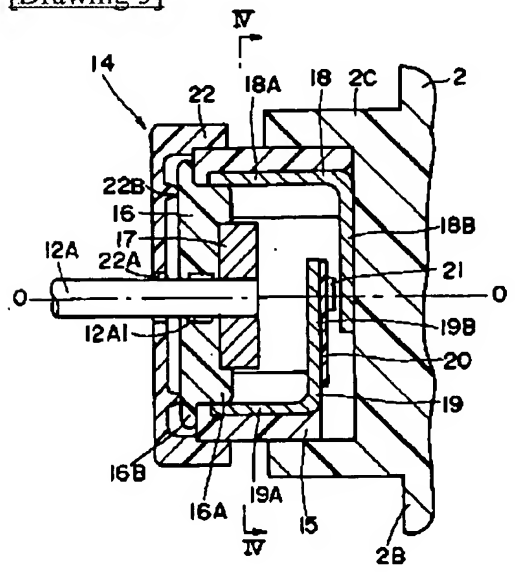
DRAWINGS

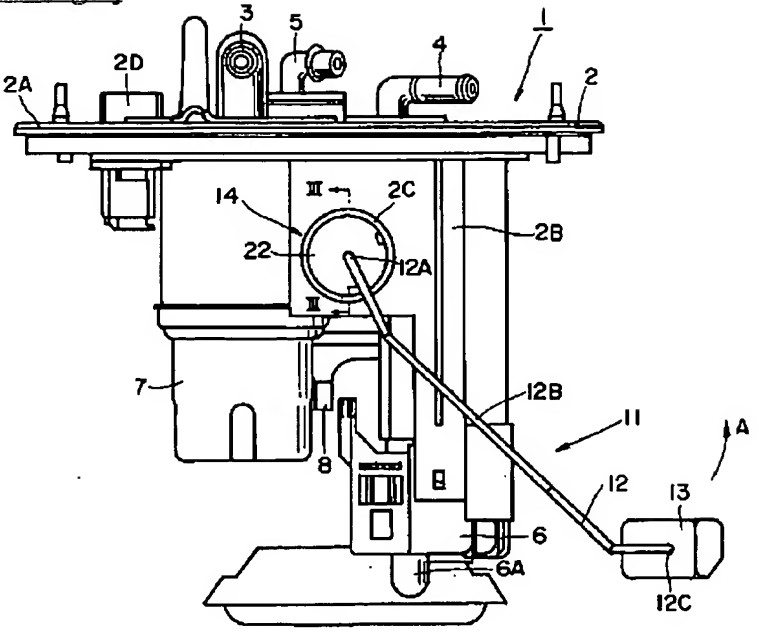
[Drawing 1]



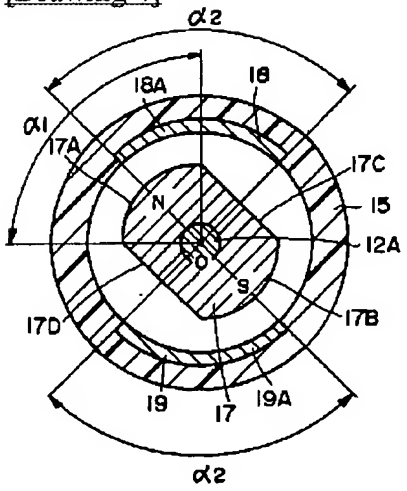
[Drawing 3]



[Drawing 2]



[Drawing 4]



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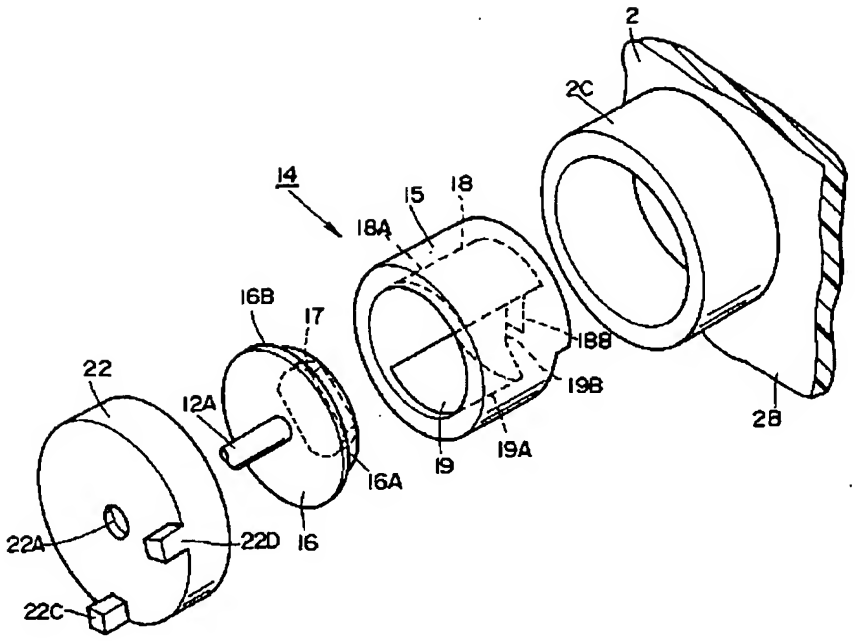
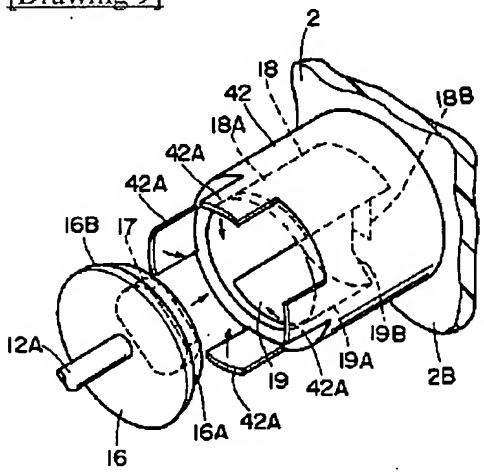
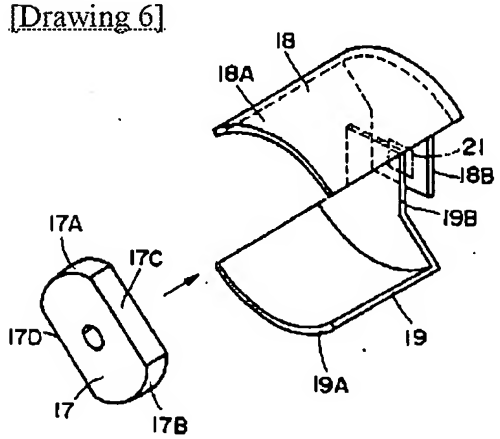


[Drawing 9]



[Drawing 6]



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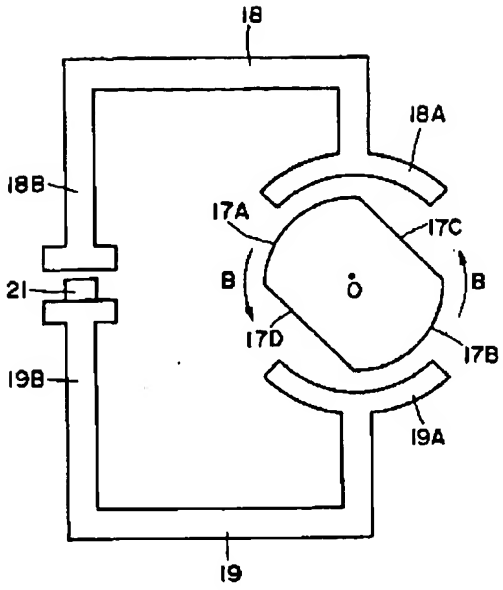

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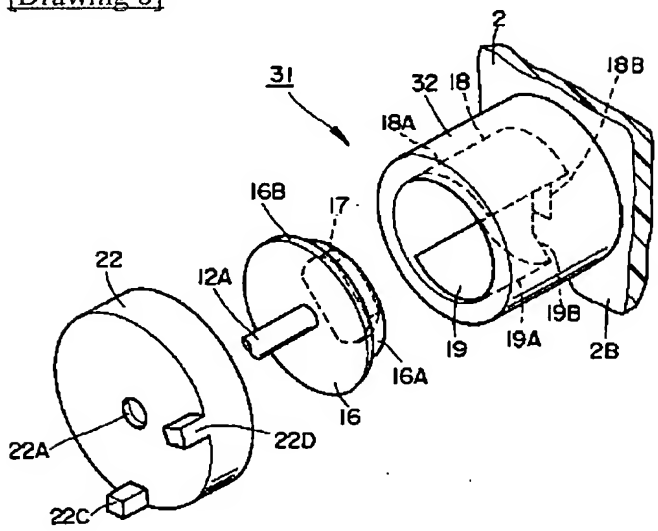
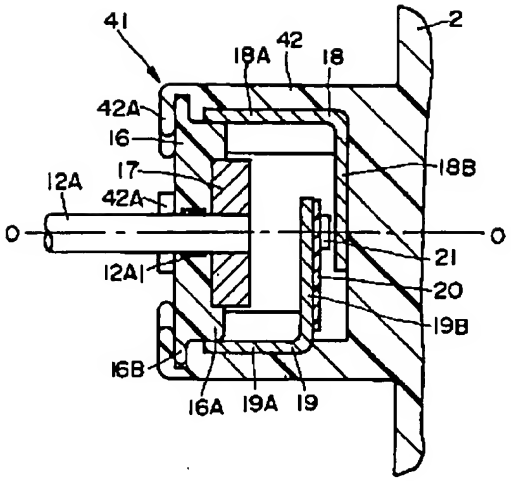


[Drawing 10]



[Translation done.]